

**Microbial Sulfate Reduction and Metal Attenuation
in pH 4 Acid Mine Water and its Potential for Acid Mine
Drainage Remediation**

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Mine water and sediments recovered from flooded workings of an abandoned Cu-Zn mine were characterized and cultured for anaerobic bacteria over a range of pH (4 to 7.5). Water-chemistry analyses of the mine water reveal preferential precipitation by H₂S of Cu and Cd, relative to Zn; and, ratios of both S and O isotopes in dissolved SO₄ that are 2-3 per mill heavier relative to those in surface waters. Lipid and phylogenetic analyses of mine sediment extracts show high biomass levels with diverse community structures composed of iron- and sulfate-reducing bacteria. These results show that microbial sulfate reduction and associated metal attenuation are currently occurring in the pH 4 mine environment and have strong implications for the remediation of acid mine drainage in engineered systems.

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